

I claim:

1. A pressure responsive mold for casting a fishing sinker containing bismuth:
a mold part having a fixed sidewall, said fixed sidewall defining a portion of an interior mold surface;
5 a retractable member, said retractable member having a face for defining a further portion of an interior mold surface said face and said fixed sidewall forming a cavity having a casting volume;
an entry port for introducing a molten metal that expands during a solidification phase into the cavity in the mold; and
10 a retaining member, said retaining member maintaining said interior mold surface and said face in position during an injection of a molten material therein, said retaining member retractable in response to an increase in the cavity pressure caused by solidification to displace the face relative to the sidewall to thereby form a solidification cavity wherein the face and the fixed sidewall contain a solidification volume that is greater than the casting
15 volume.
2. The pressure responsive mold of claim 1 wherein the retaining member comprises a spring.
- 20 3. The pressure responsive mold of claim 2 wherein the spring is loaded to generate a force that is unresponsive to movement of the face until the solidification pressure exceeds the injection pressure.
4. The pressure responsive mold of claim 1 wherein the retaining member includes a
25 source of pressurized fluid.

5. A method of casting a fishing sinker from a solidification expandable material comprising:

forming a mold having a fixed surface and a movable surface with the fixed surface and the movable surface coacting to define an injection cavity;

5 injecting a solidification expandable material into the injection cavity at an injection pressure to thereby fill the injection cavity with the solidification expandable material;

expanding the injection cavity to a solidification cavity by allowing the movable surface to retract when a solidification pressure of the molten metal exceeds the injection pressure to thereby inhibit solidification stress on an article cast therein.

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6. The method of claim 5 including the step of placing a retaining member in the mold to retain the moveable surface in position as the solidification expandable material is injected into the injection cavity.

15 7. The method of claim 6 including the step of preloading the retaining member in the mold to prevent the expansion of the injection cavity until a supply of expandable material to the injection cavity has been shut off.

20 8. The method of claim 6 wherein the step of placing a retaining member comprises placing a preloaded spring therein.

9. The method of claim 8 wherein the step of placing the preloaded spring includes the step of placing spring with a spring constant that allows expanding of the volume of the injection cavity without the solidification pressure exceeding a fracturing pressure.

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10. The method of claim 9 wherein the step of placing a bismuth or a bismuth alloy in the expandable material.

11. A mold for pressure casting:
a first mold part, said first mold part having a mold surface;
a second mold part, said second mold part having a movable mold surface with the
5 mold surface and the movable mold surface coacting to define an injection cavity when the
mold surface and the movable mold surface are in a first condition and a solidification
cavity when the mold surface and the moveable mold surface are in a second condition with
said injection cavity having an injection volume and the solidification cavity having a
solidification volume with the solidification volume greater than the injection volume to
10 thereby inhibit solidification stress on an article cast therein.
12. The mold of claim 11 including a retaining member for maintaining the first and
second mold part in the first condition until a solidification pressure within the cavity
pressure exceeds a mold injection pressure.
- 15 13. The mold of claim 12 wherein the retaining member comprises a preloaded spring.
14. The mold of claim 12 wherein the retaining member comprises a pressure cylinder.
- 20 15. The mold of claim 12 wherein the moveable surface extends along an end portion of
the injection mold cavity.
16. The mold of claim 12 wherein the moveable surface is a substantially flat surface.
- 25 17. The method of casting an article that expands upon solidification comprising:
injecting a molten metal that expands upon solidification into a cavity having a
volume V_1 ; and

increasing the volume of the cavity to a volume V_2 as the molten metal solidifies to thereby inhibit or prevent the formation of cracks and fissures in a cast article due to the expansion of the metal during the solidification phase.

5 18. The method of claim 17 including the step of forming the cavity in the shape of a fishing sinker.

19. The method of claim 17 including the step of extending a member through the cavity to form a fishing sinker with an internal opening.

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20. The method of claim 17 including the step of forming a fishing sinker with the fishing sinker having at least one region of greater mass than an adjoining region.

21. The method of claim 17 wherein the step of injecting a molten metal comprises
15 injecting bismuth in an unalloyed condition.

22. The method of claim 17 wherein the step of injecting a molten metal comprises injecting a bismuth alloy.

20 23. The method of casting an article from a metal that expands during solidification comprising the steps of;

introducing a metal at a first pressure into a mold cavity; and

maintaining a pressure in the mold cavity which is greater than the first pressure but is less than a fracture pressure as the metal in the mold cavity solidifies to thereby inhibit
25 the formation of cracks and voids in the cast article.

24. The method of claim 18 including the step of maintaining a solidification pressure at below a fracture pressure by gradually increasing the volume from V_1 to V_2 .

25. The method of claim 18 including the step of maintaining the pressure in the mold
5 cavity by forming the mold with at least one moving part and retaining the at least one moving part in position with a retaining force that is at least equal to the force on the part produced by an injection pressure.

26. The method of claim 18 including the step of maintaining the retaining force on the
10 at least one moving part while the at least one moving part retracts.

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